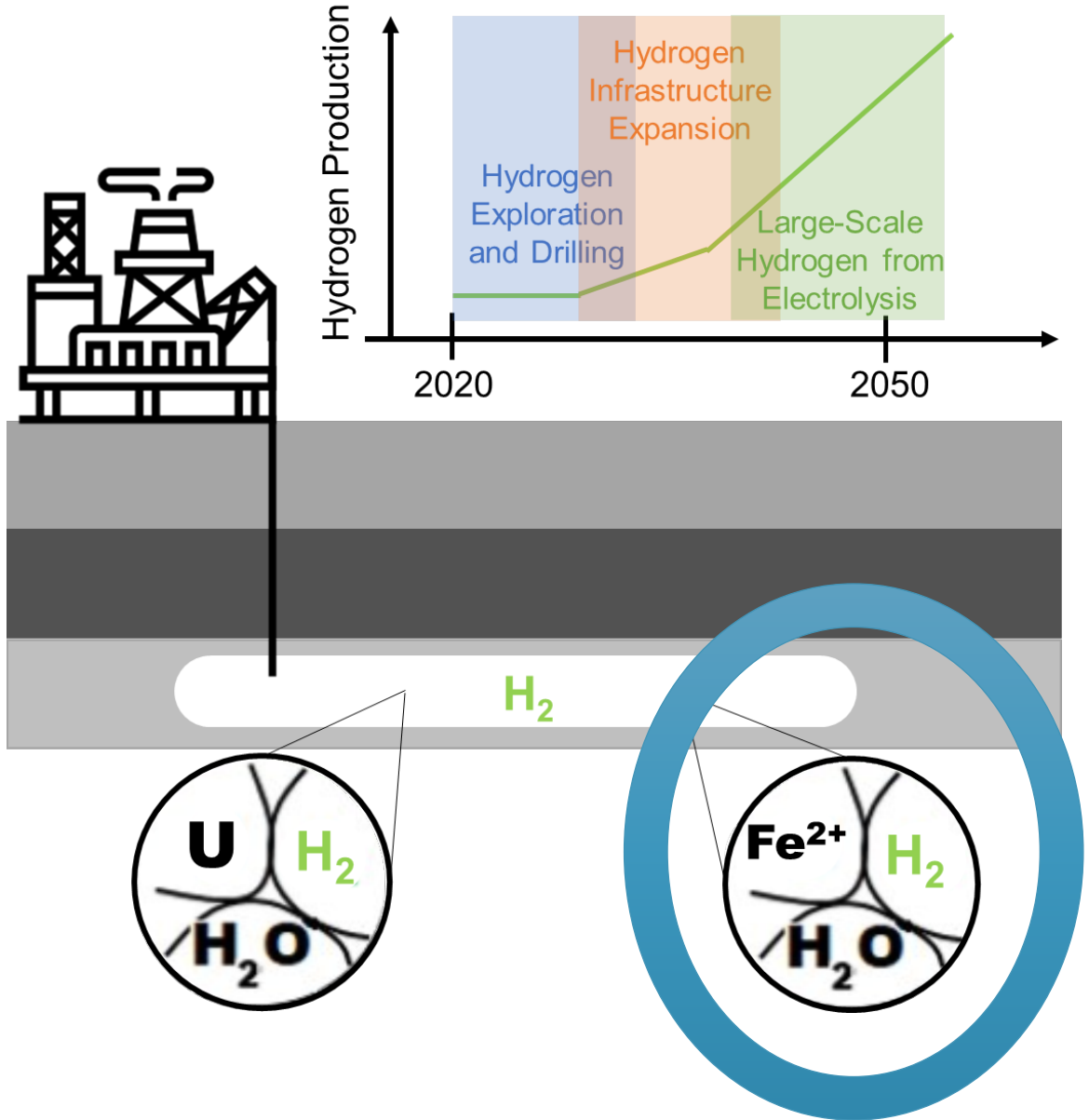
Can Georeactors Replace Alchemy to Transform Stone into Gold Hydrogen?

Following Emily Yedinak down a rabbit hole

Douglas Wicks

Question: Can we stimulate and not wait for Mother Nature?



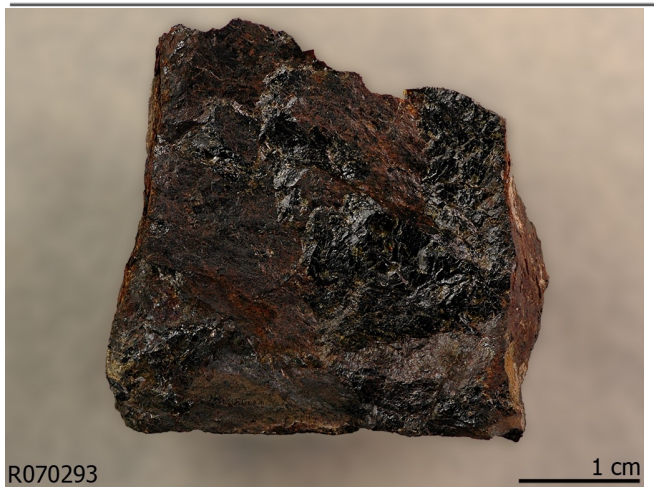
The reality of looking down a hole into White Space

Numbers get very large and loose

“Approximate” and “About” – are precise terms

Google doesn’t know where you’re going

Iron(II) Silicate – A major source of Mother Nature's H_2



$$3Fe_2SiO_4 + 2H_2O \leftrightarrow 3SiO_2 + 2Fe_3O_4 + 2H_{2(aq)};$$

fayalite + water ↔ quartz + magnetite + hydrogen.

Roughly **6.6 kg H_2/ton** of iron silicate equiv

And where do we find iron(II) silicates?

Olivine – Rarely Pure, and Never Simple

Fe reported as oxide
but really silicates

↓

~ 10% iron silicates (fayalites)

Approximate
Average Composition

Components	Olivine
SiO_2	46.43
Al_2O_3	2.55
Fe_2O_3	10.88
TiO_2	0.11
CaO	2.16
MgO	35.57
K_2O	0.39
Na_2O	0.17
MnO	0.17
Cr_2O_3	0.45
P_2O_5	0.00
ZrO_2	0.02
SO_3	0.00
BaO	0.00
ZnO	0.08
NiO	0.89
Co_3O_4	0.08
CuO	0.06
Total	100.00

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Is there enough of this to make it matter?

~40% of earth's crust is olivine-type rocks

↓

~10% Fe minerals

Let's pull out an envelope

- Weight of continental crust
  - 10^{19} ton
- 40% of which is olivinic
  - 4 x10^{18} ton
- 10% of that is iron silicate
  - 4.0 x 10^{17} ton
- 0.0066 ton H_2/ton iron silicate
  - **2.6 x 10^{15} tons of potential H_2**

Enough for millions of years of maximum H_2 demand

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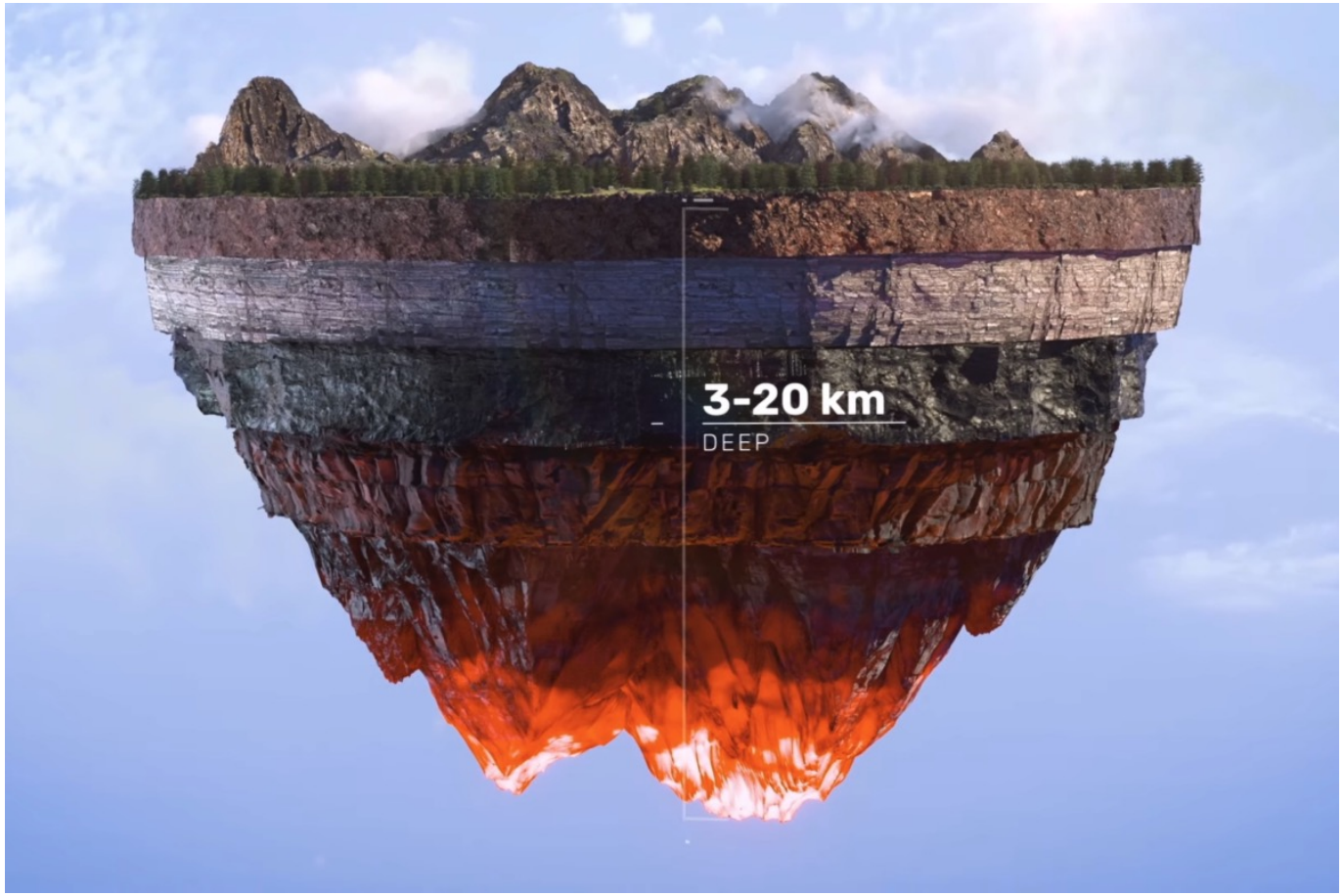
What are we waiting for? Let's go get it!

It has to be done *in situ*

Its thought to be a slow reaction

There are lots of things underground that like H_2

Where Geologic Hydrogen Produced?



Quaise Energy

Reactions occur **deep**

- Engineering georeactors kilometers underground?
- Purifying and claiming H_2 as it's formed?

Geologic Oxidation Happens under Extreme Conditions

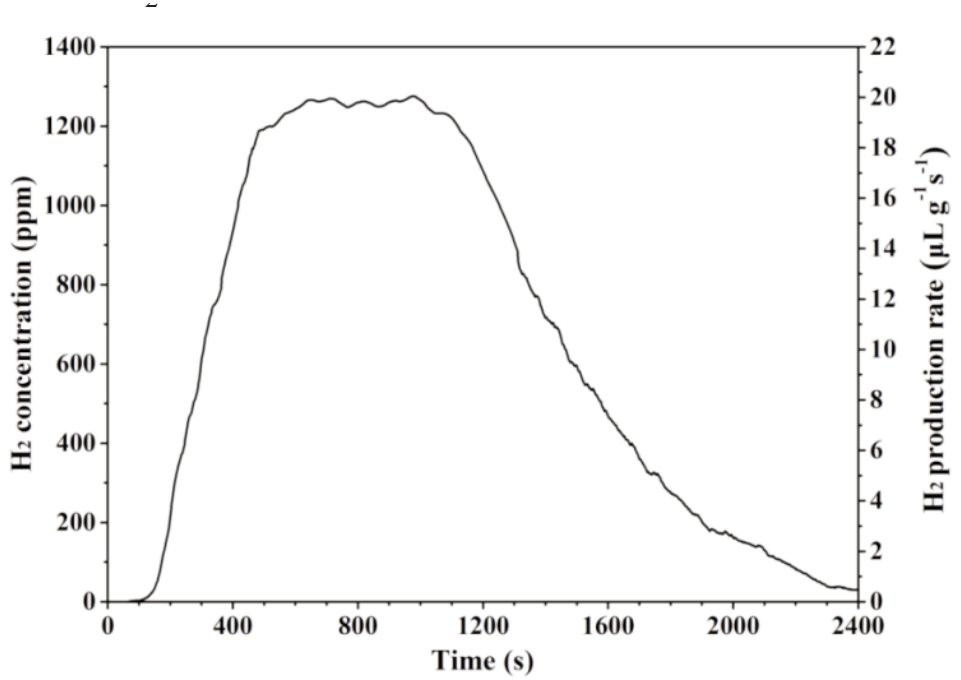


Figure 11. *The hydrogen concentration as a function of time during the oxidation process at 1000 °C*

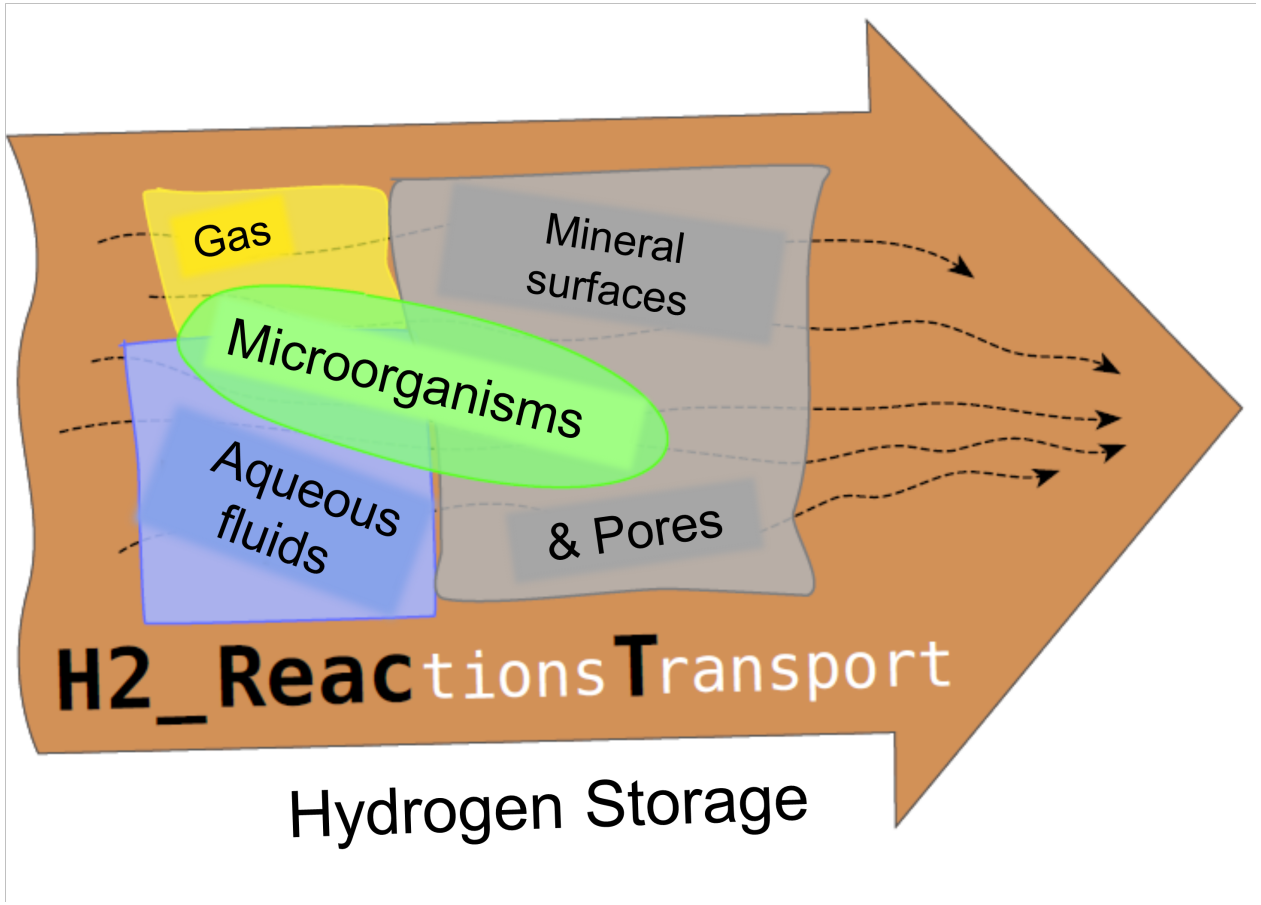
- High temp and pressure

- Can one catalyze it?

- How fast is fast enough?

J. Min. Metall. Sect. B-Metall. 54 (1) B (2018) 1 - 8

What Happens to H_2 Underground?



- Microbes use H_2
- H_2 reduces oxides/sulfides
- H_2 reacts to form methane

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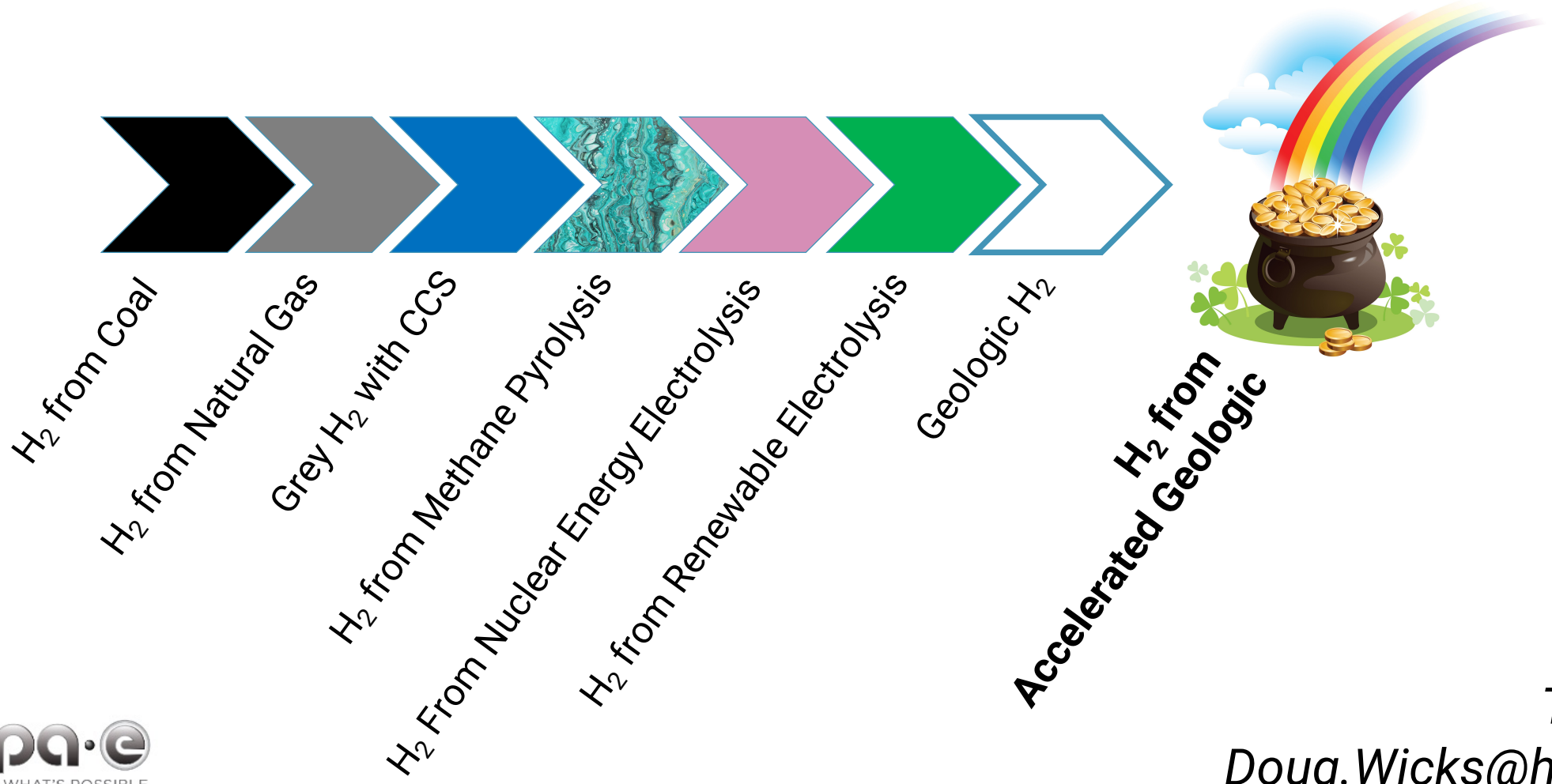
https://www.lek.rwth-aachen.de/cms/LEK/Forschung/Petrophysik/Aktuelle-Projekte/~jflsn/H2ReacT-Transport-von-Wasserstoff-in-G/lidx/1/

So – What can you bring to the tea party?

- Finding and reaching deep earth deposits
  - Catalyzing this mineral reaction
    - Eliminating parasitic H_2 reactions

Thank You

Let's Reach for the end of the Hydrogen Rainbow



Thoughts?
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